



**THE DATASHEET OF
C3D08065I**



C3D08065I

3rd Generation 650 V, 8 A Silicon Carbide Schottky Diode

Description

With the performance advantages of a Silicon Carbide (SiC) Schottky Barrier diode, power electronics systems can expect to meet higher efficiency standards than Si-based solutions, while also reaching higher frequencies and power densities. SiC diodes can be easily paralleled to meet various application demands, without concern of thermal runaway. In combination with the reduced cooling requirements and improved thermal performance of SiC products, SiC diodes are able to provide lower overall system costs in a variety of diverse applications.



Package Type: Isolated TO-220-2
Marking: C3D08065I

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Features

- Low Forward Voltage (V_F) Drop with Positive Temperature Coefficient
- Zero Reverse Recovery Current / Forward Recovery Voltage
- Temperature-Independent Switching Behavior
- Electrically Isolated Package (2.5kV)

Applications

- Industrial Switched Mode Power Supplies
- Uninterruptible & AUX Power Supplies
- Boost for PFC & DC-DC Stages
- Solar Inverters
- AC/DC Converters

Maximum Ratings ($T_c = 25^\circ\text{C}$ Unless Otherwise Specified)

| Parameter | Symbol | Value | Unit | Test Conditions | Notes |
|---|------------------|-------|------------------|--|--------|
| Repetitive Peak Reverse Voltage | V_{RRM} | 650 | V | | |
| DC Blocking Voltage | V_{DC} | 650 | | | |
| Continuous Forward Current | I_F | 16.5 | A | $T_c = 25^\circ\text{C}$ | Fig. 3 |
| | | 8 | | $T_c = 130^\circ\text{C}$ | |
| | | 7.5 | | $T_c = 135^\circ\text{C}$ | |
| Repetitive Peak Forward Surge Current | I_{FRM} | 29 | A | $T_c = 25^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$ | |
| | | 19 | | $T_c = 110^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$ | |
| Non-Repetitive Forward Surge Current | I_{FSM} | 69 | A | $T_c = 25^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$ | Fig. 8 |
| | | 55 | | $T_c = 110^\circ\text{C}, t_p = 10\text{ ms}, \text{Half Sine Wave}$ | |
| Non-Repetitive Peak Forward Surge Current | $I_{F,Max}$ | 650 | A | $T_c = 25^\circ\text{C}, t_p = 10\text{ }\mu\text{s}, \text{Pulse}$ | |
| | | 530 | | $T_c = 110^\circ\text{C}, t_p = 10\text{ }\mu\text{s}, \text{Pulse}$ | |
| Power Dissipation | P_{tot} | 53.6 | W | $T_c = 25^\circ\text{C}$ | Fig. 4 |
| | | 23.2 | | $T_c = 110^\circ\text{C}$ | |
| Diode dV/dt ruggedness | dV/dt | 200 | V/ns | $V_R = 0\text{-}650\text{V}$ | |
| i ² t value | j ² t | 23.8 | A ² s | $T_c = 25^\circ\text{C}, t_p = 10\text{ ms}$ | |
| | | 15 | | $T_c = 110^\circ\text{C}, t_p = 10\text{ ms}$ | |

Electrical Characteristics

| Parameter | Symbol | Typ. | Max. | Unit | Test Conditions | Notes |
|---------------------------|--------|------|------|---------------|---|--------|
| Forward Voltage | V_F | 1.5 | 1.8 | V | $I_F = 8 \text{ A}, T_j = 25 \text{ }^\circ\text{C}$ | Fig. 1 |
| | | 2.1 | 2.4 | | $I_F = 8 \text{ A}, T_j = 175 \text{ }^\circ\text{C}$ | |
| Reverse Current | I_R | 10 | 51 | μA | $V_R = 650 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$ | Fig. 2 |
| | | 12 | 204 | | $V_R = 650 \text{ V}, T_j = 175 \text{ }^\circ\text{C}$ | |
| Total Capacitive Charge | Q_C | 20 | | nC | $V_R = 400 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, I_F = 8 \text{ A}$ | Fig. 5 |
| Total Capacitance | C | 395 | | pF | $V_R = 0 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$ | Fig. 6 |
| | | 37 | | | $V_R = 200 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$ | |
| | | 32 | | | $V_R = 400 \text{ V}, T_j = 25 \text{ }^\circ\text{C}, f = 1 \text{ MHz}$ | |
| Capacitance Stored Energy | E_C | 3.0 | | μJ | $V_R = 400 \text{ V}$ | Fig. 7 |

Notes:

SiC Schottky Diodes are majority carrier devices, so there is no reverse recovery charge.

Thermal & Mechanical Characteristics

| Parameter | Symbol | Value | Unit | Notes |
|--|------------------------|-------------|-----------------------------|------------|
| Thermal Resistance, Junction to Case (Typical) | $R_{\theta, JC (TYP)}$ | 2.8 | $^\circ\text{C} / \text{W}$ | |
| Junction Temperature | T_j | -55 to +175 | $^\circ\text{C}$ | |
| Case & Storage Temperature | T_c | -55 to +175 | | |
| TO-220 Mounting Torque | - | 1 | Nm | M3 Screw |
| | | 8.8 | lbf-in | 6-32 Screw |

Electrostatic Discharge (ESD) Classifications

| Parameter | Symbol | Notes |
|---------------------|--------|------------------------------------|
| Human Body Model | HBM | Class 3B ($\geq 8000 \text{ V}$) |
| Charge Device Model | CDM | Class C3 ($\geq 1000 \text{ V}$) |

Typical Performance

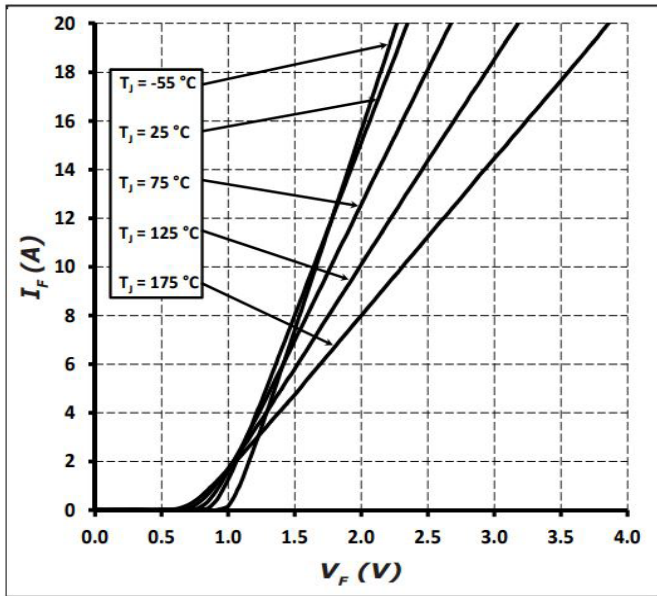


Figure 1
Forward Characteristics

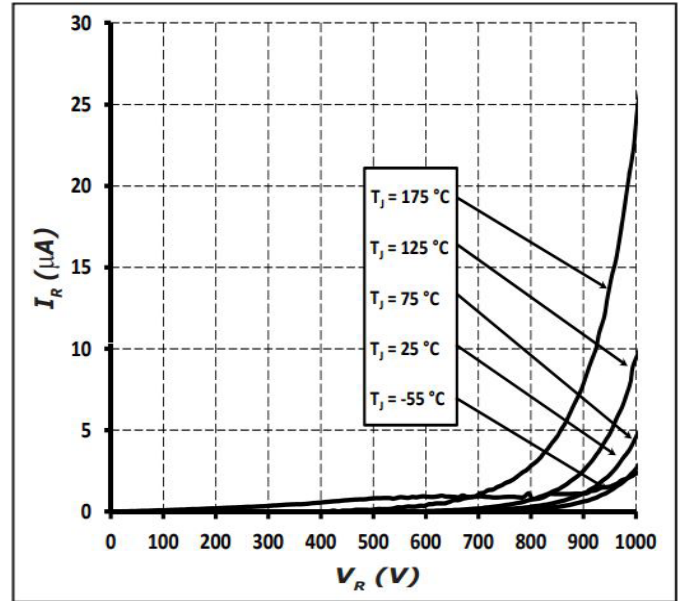


Figure 2
Reverse Characteristics

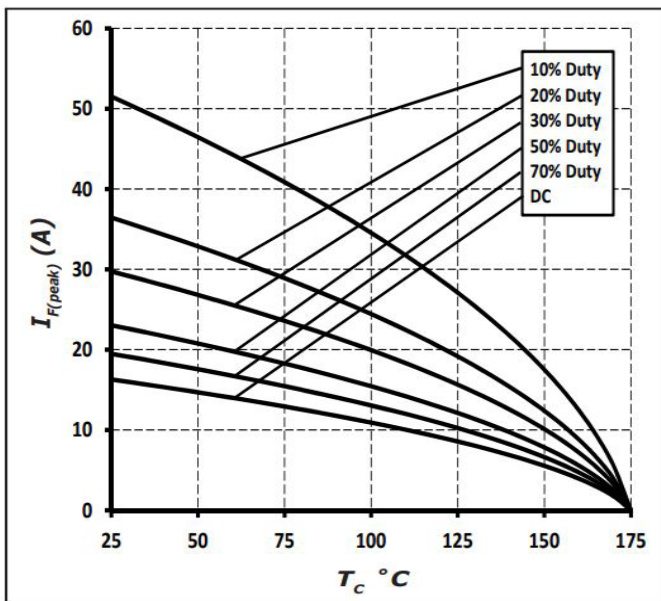


Figure 3
Current Derating

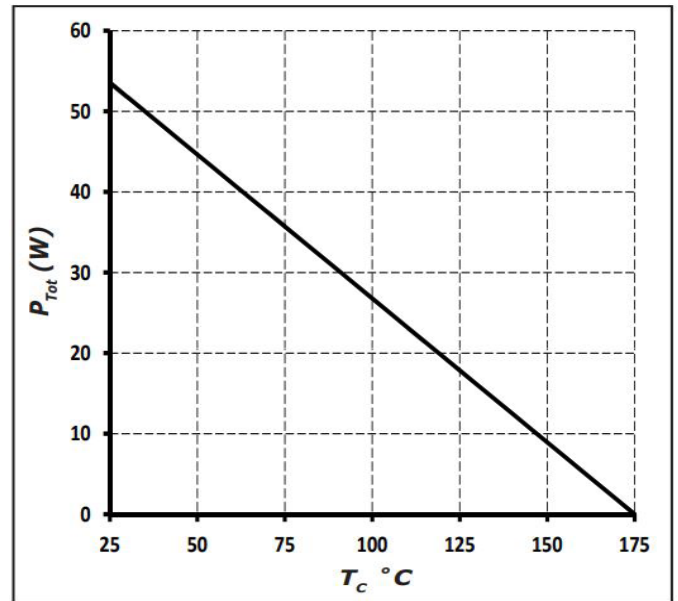


Figure 4
Power Derating

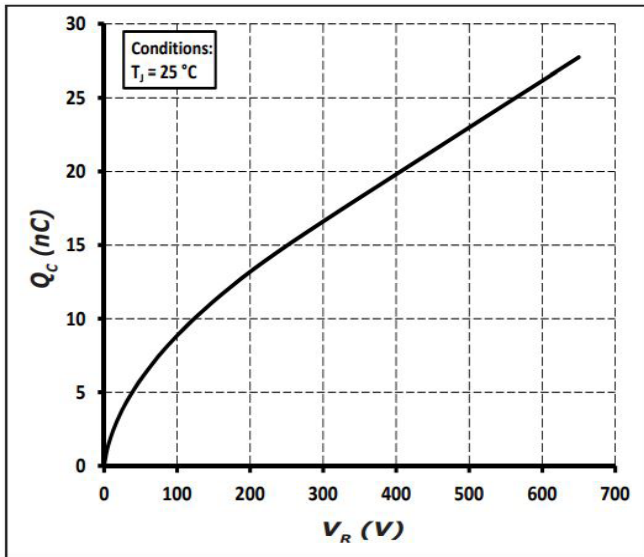


Figure 5

Total Capacitance vs. Reverse Voltage

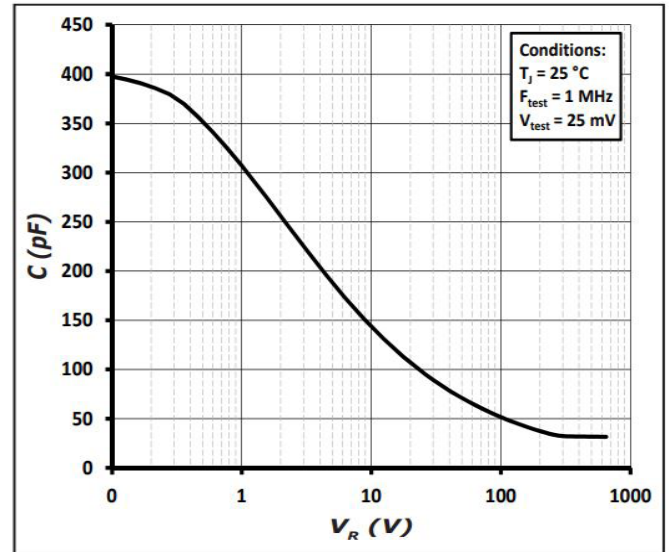


Figure 6

Capacitance vs. Reverse Voltage

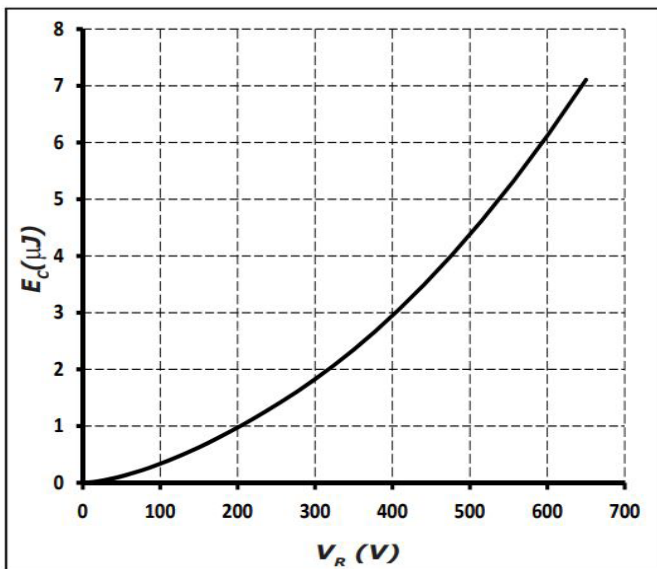


Figure 7

Capacitance Stored Energy

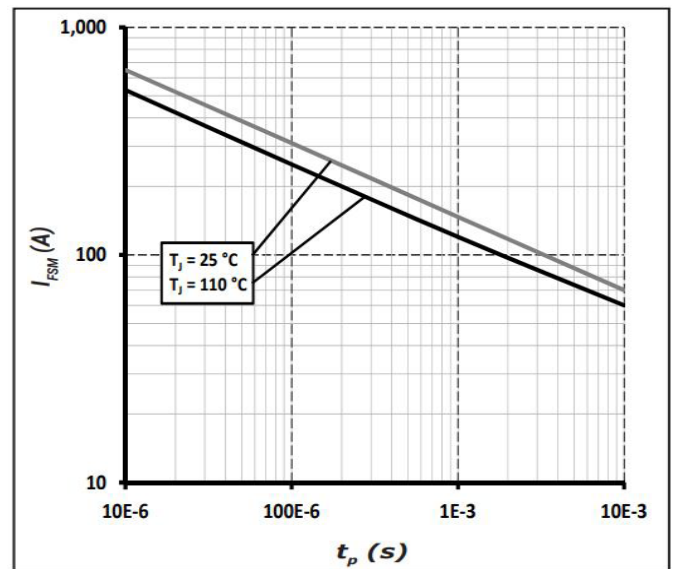


Figure 8

Non-Repetitive Peak Forward Surge Current versus Pulse Duration (sinusoidal waveform)

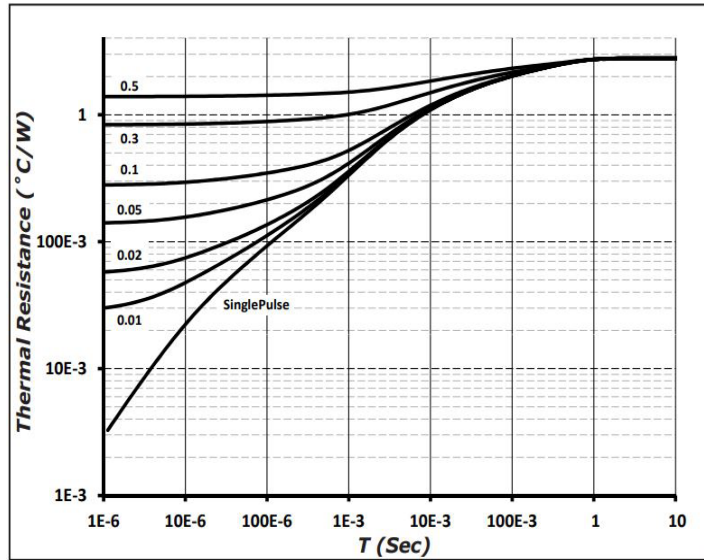
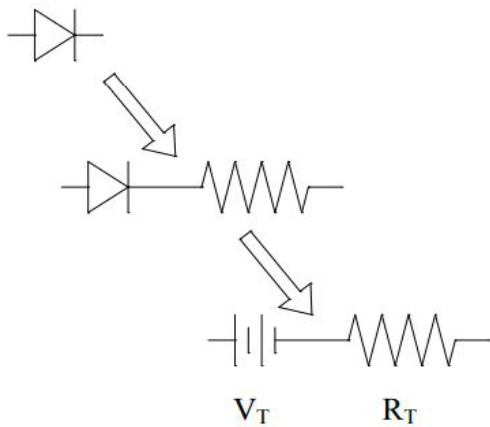


Figure 9
Transient Thermal Impedance

Diode Model



$$V_{fT} = V_T + I_f * R_T$$

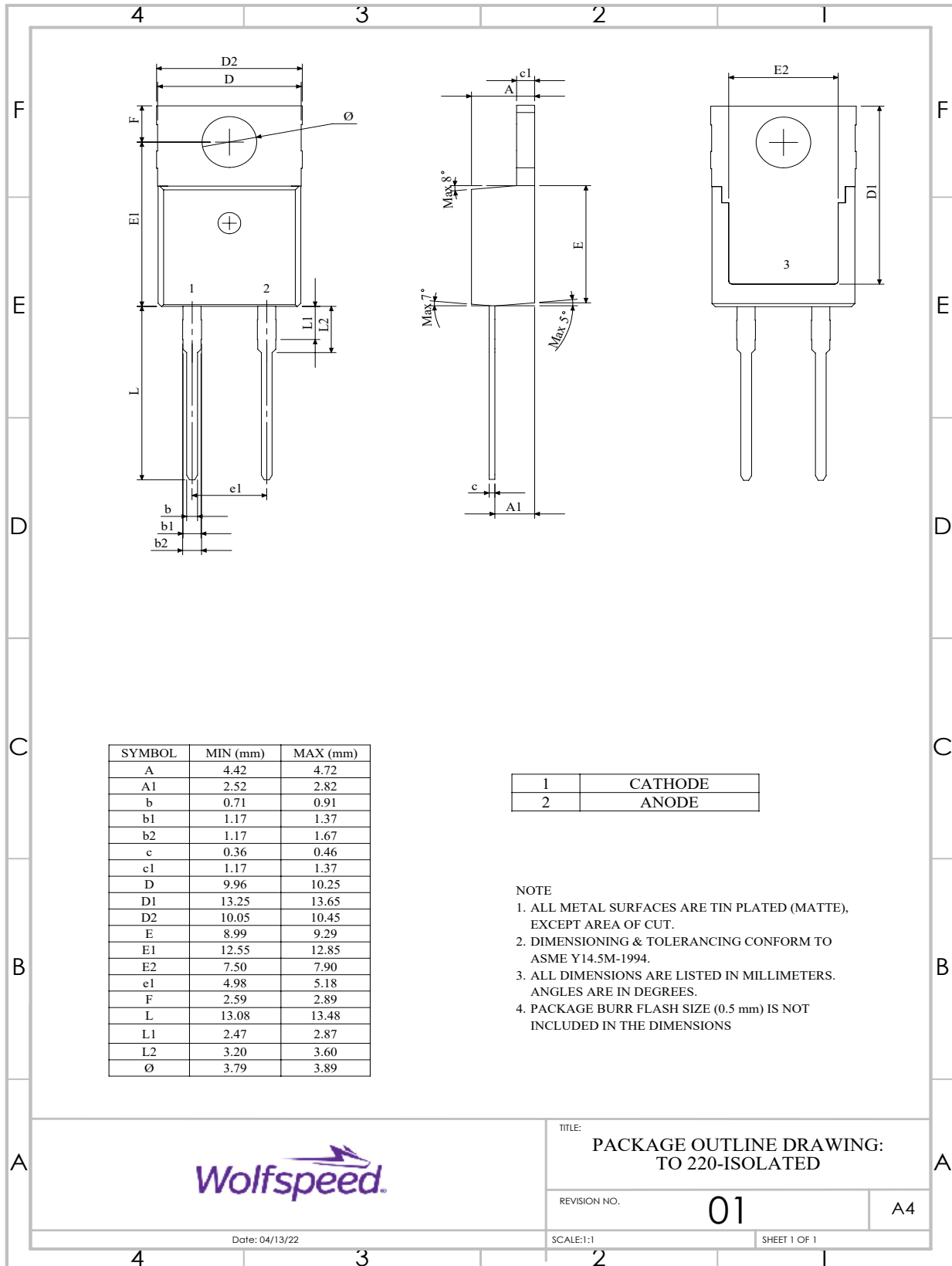
$$V_T = 0.96 + (T_j * -1.1 * 10^{-3})$$

$$R_T = 0.07 + (T_j * 7.4 * 10^{-4})$$

Note: T_j = Diode Junction Temperature In Degrees Celsius, valid from 25°C to 175°C

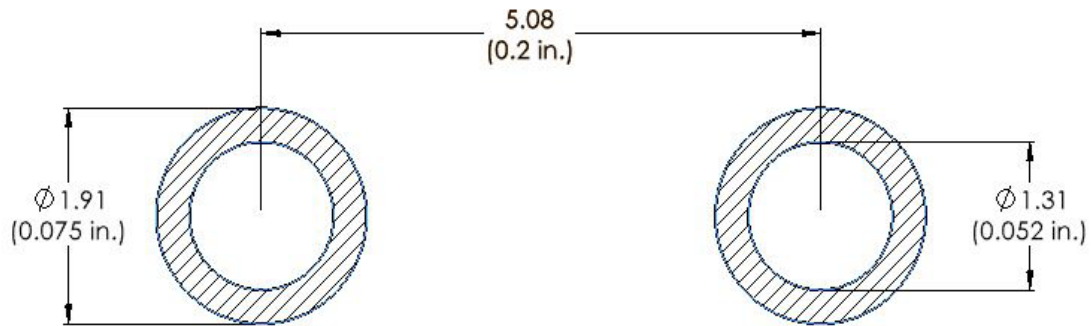
Package Dimensions & Pin-Out

Package: TO-220-2



Recommended Solder Pad Layout

Primary dimensions shown in mm.



Product Ordering Information

| Order Number | Packing Type |
|--------------|--------------|
| C3D08065I | Tube |



Revision History

| Document Version | Date of Release | Description of Changes |
|------------------|-----------------|--|
| C | January-2018 | Initial Release |
| 5 | May-2023 | Update Package Drawing Update Landing Pad |

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Contact info:

4600 Silicon Drive
Durham, NC 27703 USA
Tel: +1.919.313.5300
www.wolfspeed.com/power

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